

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
24 February 2005 (24.02.2005)

PCT

(10) International Publication Number
WO 2005/017978 A3

(51) International Patent Classification⁷: H01L 31/032,
31/18

(21) International Application Number:
PCT/IB2004/051458

(22) International Filing Date: 13 August 2004 (13.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003/6316 14 August 2003 (14.08.2003) ZA
2004/2497 30 March 2004 (30.03.2004) ZA

(71) Applicant (for all designated States except US): RAND
AFRIKAANS UNIVERSITY [ZA/ZA]; Cnr Kingsway
& University Roads, Auckland Park, 2006 Johannesburg
(ZA).

(72) Inventor; and

(75) Inventor/Applicant (for US only): ALBERTS, Vivian

[ZA/ZA]; Department of Physics, Rand Afrikaans Univer-
sity, Cnr Kingsway & University Roads, Auckland Park,
2006 Johannesburg (ZA).

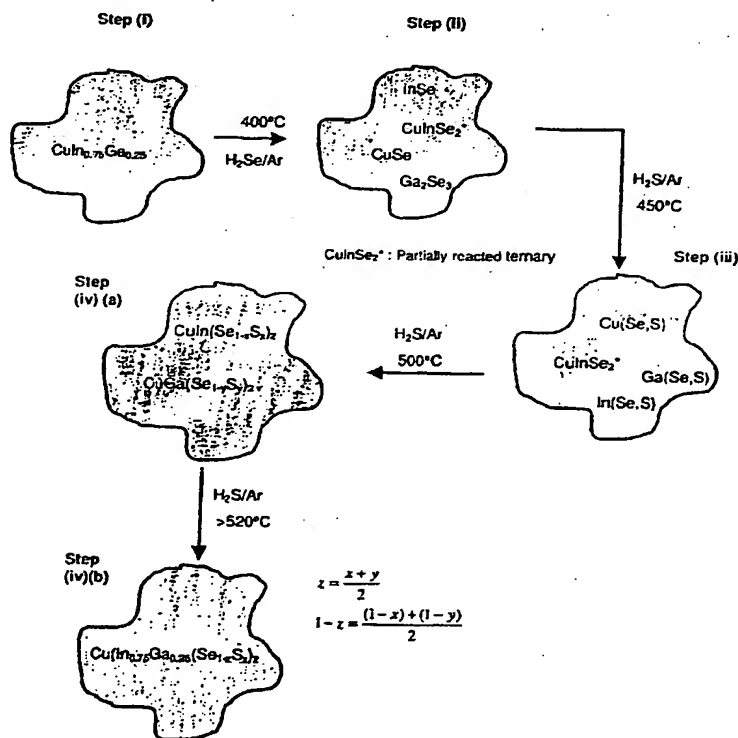
(74) Agent: DM KISCH INC; P O Box 781218, 2146 SAND-
TON (ZA).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: METHOD FOR THE PREPARATION OF GROUP IB-III A-VIA QUATERNARY OR HIGHER ALLOY SEMICON-
DUCTOR FILMS



(57) Abstract: This invention relates to a method for producing group IB-III A-VIA quaternary or higher alloy semiconductor films wherein the method comprises the steps of (i) providing a metal film comprising a mixture of group IB and group III A metals; (ii) heat treating the metal film in the presence of a source of a first group VIA element (said first group VIA element hereinafter being referred to as VIA₁) under conditions to form a first film comprising a mixture of at least one binary alloy selected from the group consisting of a group IB -VIA₁ alloy and a group III A-VIA₁ alloy and at least one group IB-III A-VIA₁ ternary alloy (iii) optionally heat treating the first film in the presence of a source of a second group VIA element (said second group VIA element hereinafter being referred to as VIA₂) under conditions to convert the first film into a second film comprising at least one alloy selected from the group consisting of a group IB-VIA₁-VIA₂ alloy and a group III A-VIA₁-VIA₂ alloy; and the at least one group IB-III A-VIA₁ ternary alloy of step (ii); (iv) heat treating either the first film or second film to form a group IB-III A-VIA quaternary or higher alloy semiconductor film.



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— with international search report

(88) Date of publication of the international search report:

13 October 2005